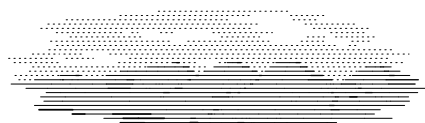## DATELINE: LOS ALAMOS

NEW INFORMATION SYSTEM ASSISTS PHYSICIANS IN IDENTIFYING EFFECTIVE TREATMENTS FOR CHRONIC LUNG DISEASES

TECHNOLOGY WILL IMPROVE PATIENT CARE AND LOWER TREATMENT COSTS

The prognosis is good for a new information system developed at Los Alamos and currently being tested by respiratory disease experts at the National Jewish Center in Denver. The goal of the new system, called TeleMed, is to lower treatment costs and improve patient care by dramatically improving doctors' access to patient records and past treatment histories.

TeleMed is a nationwide computer-based system that allows physicians working in hospitals and clinics to access radiographic information such as X-rays and computed tomography, or CT, scans from a national repository located at Los Alamos. The technology can give a physician a patient's complete treatment history in a few seconds, thus speeding diagnosis and treatment and reducing treatment costs by thousands of dollars.

DATELINE: LOS ALAMOS

Medical personnel from other organizations can access the power of the Los Alamos supercomputers through the TeleMed system.
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At present, physicians at the National Jewish Center for Immunology and Respiratory Medicine must obtain voluminous patient records from many different locations to review treatment histories and successes for multi-drug-resistant tuberculosis and other complex respiratory diseases. For patients with chronic lung diseases, the records may be several feet thick and contain as many as 200 X-ray images. The entire process can take hours of reading and review.

The difficulty physicians have in gathering and studying poorly organized patient information to prescribe effective treatment is a chronic condition in itself, according to Dr. John Newell, director of radiology at the NJC.
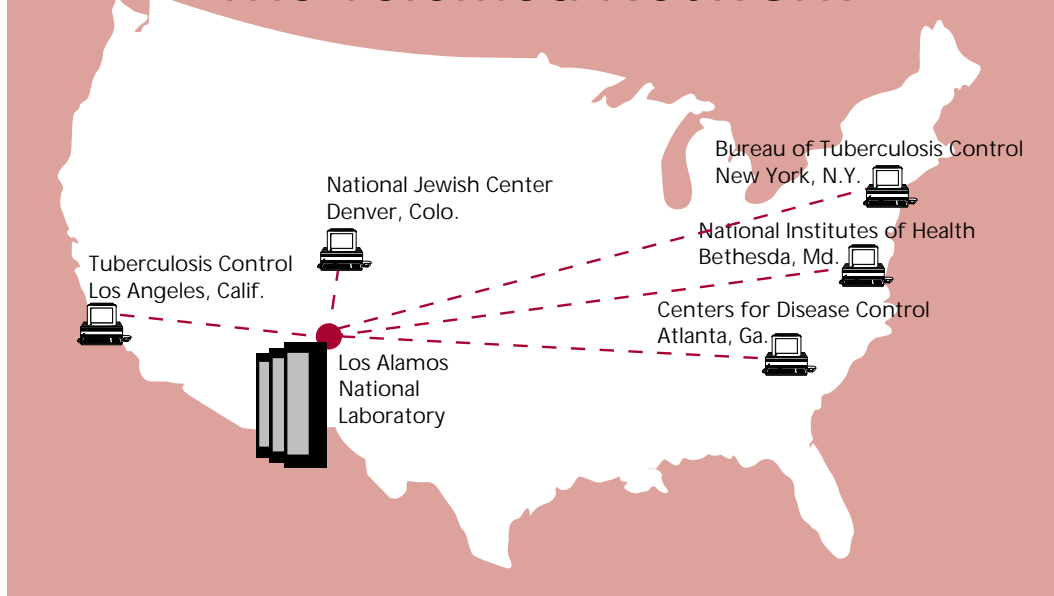
The Centers for Disease Control and Prevention report an increase in outbreaks of multi-drug-resistant tuberculosis with high fatality rates. Part of the reason for the increase, according to the National Institutes of Health, includes delayed diagnosis and ineffective treatment resulting in prolonged infections that become resistant to conventional drug therapy.

To speed identification of successful tuberculosis treatments, Los Alamos researchers are using supercomputers such as the Silicon Graphics Inc. Challenge XL and the Cray Research Inc. T3D to drive a radiographic records repository and telecollaboration system for the NJC and eventually other sites such as the NIH and the CDC.

The *TeleMed* Network

Bureau of Tuberculosis Control
New York, N.Y.

National Jewish Center
Denver, Colo.

National Institutes of Health
Bethesda, Md.

Tuberculosis Control
Los Angeles, Calif.

Centers for Disease Control
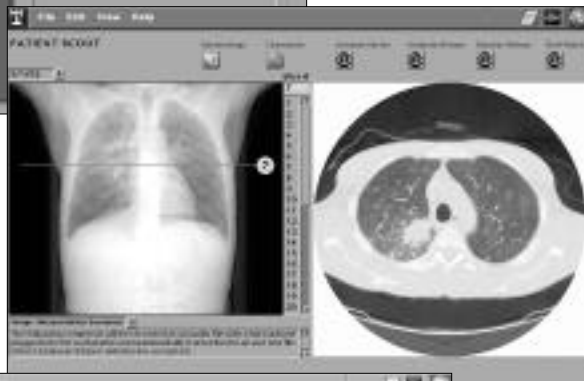Atlanta, Ga.

Los Alamos
National
Laboratory

DATELINE: LOS ALAMOS

The physicians at the NJC access the TeleMed database using their desktop computers and a user-friendly, icon-based software system. With the click of a mouse button, the physician chooses a patient record from a list of patients displayed on the screen. Following that choice, the computer screen displays several icons for patient history, drug therapy, bacteriology, computed tomography or CT scans, and reports.

With TeleMed, a doctor can match a patient's current radiographic information with archival data in the Los Alamos repository, review treatment history and successes, and then determine the best treatment. The TeleMed system layers information so that doctors can track chronologically what medications or treatments have been tried and worked.

← With the click of a mouse button, a physician working in a hospital or clinic can use TeleMed to access radiographic information from a national repository located at Los Alamos.

The patient's computer record is empty until populated by requests for information. For example, when the doctor clicks on the "drug therapy" icon, the TeleMed system harvests data from all appropriate sites, such as the NIH or the CDC. By choosing the "images" icon, the doctor calls up pertinent radiographic images. The images can be animated to show a progressive cross-section of the lungs, from the initial diagnostic X-rays to the most recent images.

By better organizing patient records, TeleMed allows the doctors to focus on treatments, resulting in lower costs and better patient care. For example, a doctor can arrest a tuberculosis case before it becomes drug-resistant for about $10,000. If a patient's tuberculosis becomes drug-resistant, treatment may cost up to $200,000.

DATELINE: LOS ALAMOS

The radiographic data housed in the Los Alamos supercomputers is obtained either directly from a digital CT system or by scanning X-ray films. For now, Laboratory personnel input the records into the database. In the future, medical personnel will be able to enter the data from their place of work.

Medical personnel also can access the power of Los Alamos' supercomputers through TeleMed. The supercomputers will search the repository of radiographic images to find all those exhibiting certain specified features.

With the aid of a supercomputer, target images can be found in about 5 seconds. By comparison, it takes more than 75 seconds to perform the same search on a high-performance workstation. The researchers believe they can reduce the 5-second search to less than a second by exploiting the massively parallel architecture of Los Alamos' supercomputers.

Los Alamos plans to make TeleMed available to other tuberculosis programs in the United States, including the New York Bureau of Tuberculosis and the Los Angeles Department of Health Services.

TeleMed preserves patient confidentiality by requiring users to type in a series of passwords. As the system develops and more centers are brought online, researchers say patient confidentiality can be maintained.

If successful, the TeleMed project could eventually run as an application on the Internet, linking major hospitals with research, medical, and government institutions such as the CDC and the NIH.

TeleMed is part of a larger Los Alamos project called Sunrise, a prototype of a national information infrastructure development program. The object of Sunrise is to tie together computer technologies such as networking, distributed computing, security, multi-media, and data mining with specific applications.

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Los Alamos researcher Dick Phillips (standing) and summer student Kevin Gunn use the TeleMed system to call up lung images.

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